

CLAIMS:

1. A process for the conversion of a substantially fluid phase substrate (15) by heterogeneous contact of the substrate (15) or a fragment or derivative thereof with a substantially solid phase agent wherein the solid phase agent is comprised as a surface (5,33,35) of a support element (3) or part thereof and the support element (3) is adapted to rotate around an axis (6) such that the solid phase agent provides a rotating surface (5,33,35) or part thereof and the substrate (15) provides a film (17) flowing substantially radially outward from the axis (6) in dynamic contact with the agent; characterised in that additional vibrational energy is applied to the substrate (15).
2. A process according to claim 1, wherein the additional vibrational energy is applied to the substrate (15) when on the rotating surface (5,33,35).
3. A process according to claim 1 or 2, wherein the additional vibrational energy is applied to the substrate (15) as it is being supplied to the rotating surface (5,33,35).
4. A process according to claim 1, 2 or 3, wherein the additional vibrational energy is applied to the substrate (15) after it has flowed across the rotating surface (5,33,35).
5. A process according to any preceding claim, wherein the additional vibrational energy is applied as ultrasound.
6. A process according to any preceding claim, wherein the rotating surface (5,33,35) is mechanically vibrated.
7. A process according to claim 6, wherein the rotating surface (5,33,35) is mounted off-centre on the axis of rotation (6).
8. A process according to claim 6 or 7, wherein the surface (5,33,35) is flexibly mounted on the support element (3).
9. A process according to claim 6, 7 or 8, wherein a mechanical vibrator is attached to the surface (5,33,35) or the support element (3).

10. A process according to claim 5, wherein the axis (6) is substantially vertical with the support element (3) adapted to rotate thereabout with the surface (5,33,35) uppermost, and wherein ultrasound is applied to the substrate (15) from an ultrasonic emitter located above the surface (5,33,35).
- 5 11. A process according to any previous claim, wherein the solid phase agent is in the form of a mesh, grid or corrugated surface.
- 10 12. A process according to any previous claim, wherein the solid phase agent comprises a nucleation or growth agent adapted for fluid phase substrate conversion by phase change to form crystals or grow seed crystals.
- 15 13. A process according to any one of claims 1 to 11, wherein the solid phase agent comprises a reagent, catalyst or initiator adapted for fluid phase substrate conversion by reaction to form products.
14. A process according to claim 13, wherein the solid phase agent is a zeolite.
- 20 15. A process according to claim 13, wherein the solid phase agent is a refractory oxide (34,35).
16. A process according to claim 13, wherein the solid phase agent is a sol gel.
- 25 17. A process according to claim 13, wherein the solid phase agent is Phillips catalyst.
18. A process according to any one of claims 12 to 17, wherein the solid phase agent is sprayed onto the surface (5,33,35).
- 30 19. A process according to any preceding claim, wherein additional thermal or radiation energy, including UV, IR, microwave, RF, X-ray, electric fields and magnetic fields, is applied to the substrate (15).